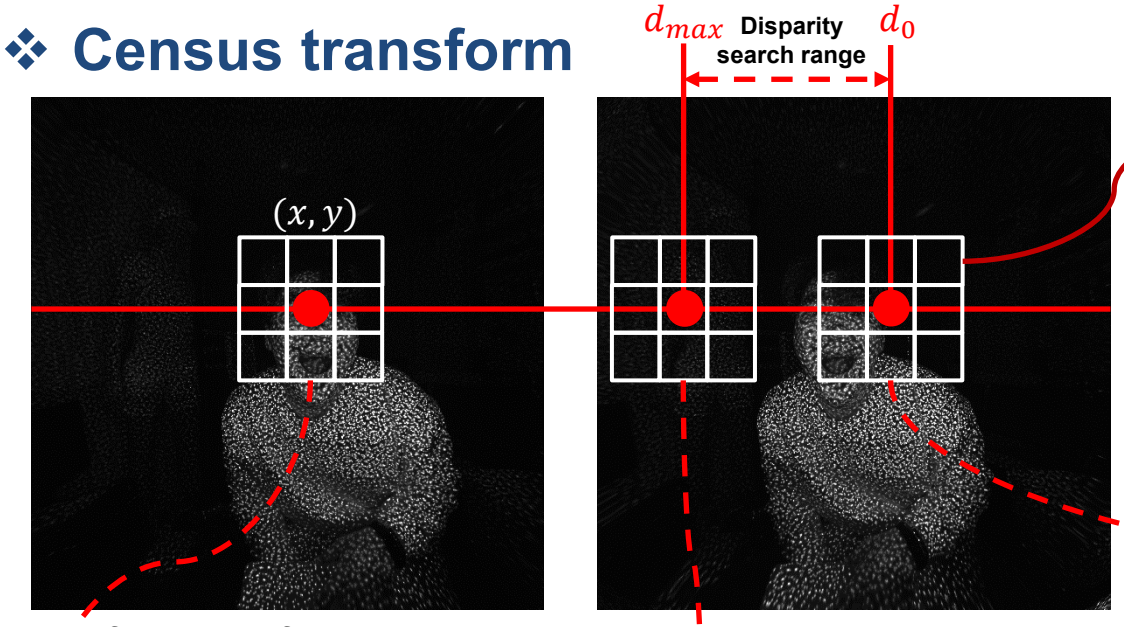
Census transform stereo matching

❖ Census transform



Reference image의 각 픽셀 위치 마다
target image와의 census transform 결과를 matching을 하여
cost가 가장 작은 disparity를 구하는 방식

(코드 구현은 left & right image를 census transform 한 뒤,
target을 shift 하면서 cost volume을 생성하는 방식을 사용함)

대소비교
If 중심 > 주변 → 1
If 중심 <= 주변 → 0

5	28	7
57	62	76
24	85	91

Left window

1	1	1
1		0
1	0	0

75	12	73
24	53	7
88	61	45

Right window (d_{max})

0	1	0
1		1
0	0	1

$\text{Census}(x, y)_{\text{left}} = \{1, 1, 1, 1, 0, 1, 0, 0\}$

$\text{Census}(x - d_{max}, y)_{\text{left}} = \{0, 1, 0, 1, 1, 0, 0, 1\}$

$\text{Census matching cost}(d_{max}) = 5$

5	28	7
57	62	76
24	85	91

Left window

1	1	1
1		0
1	0	0

25	84	36
24	49	18
7	64	61

Right window (d_0)

1	0	1
1		1
1	0	0

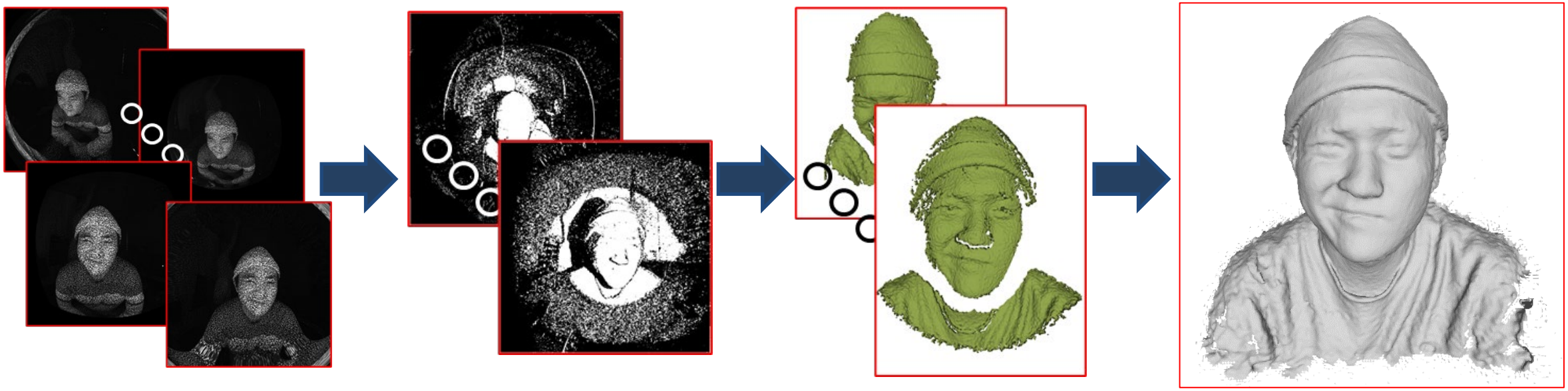
$\text{Census}(x, y)_{\text{left}} = \{1, 1, 1, 1, 0, 1, 0, 0\}$

$\text{Census}(x - d_0, y)_{\text{left}} = \{1, 0, 1, 1, 1, 1, 0, 0\}$

$\text{Census matching cost}(d_0) = 2$

3D Reconstruction with multi-view stereo cameras

❖ Mesh reconstruction



Input: pair images

Disparities from pair images

3D point clouds from Disparities

Output: reconstructed mesh